Social and Solidarity Economy Web Information Systems:
State of the Art and an Interoperability Framework

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ABSTRACT

This paper presents the state of the art on interoperability developments for the social and solidarity economy (SSE) community web based information systems (WIS); it also presents a framework of interoperability for the SSE' WIS and the developments made in a research-in-progress PhD project in the last 3 years. A search on the bibliographic databases showed that so far there are no papers on interoperability initiatives on the SSE, so it was necessary to have other sources of information: a preliminary analysis of the WIS that support SSE activities; and interviews with the representatives of some of the world's most important SSE organisations. The study showed that the WIS are still not interoperable yet. In order to become interoperable a group of the SSE community has been developing a Dublin Corre Application Profile to be used by the SSE community as reference and binding to describe their resources. This paper also describes this on-going process.

Keywords: *Dublin Corre Application Profile, Interoperability, Semantic Interoperability, Semantic Web, Social and Solidarity Economy*

INTRODUCTION

The Social and Solidarity Economy (SSE) can be broadly defined as a type of economy in which the goals are different either from the ones of the market economy or from the state's (Lechat, 2007). Allegedly, these goals are neither centered in profit nor in individualistic needs. It is an economy that presents itself as a material and human alternative to capitalist economy (Cattani, Laville, Gaiger, & Hespanha, 2009).

Social and solidarity economy organisations are composed of self-organized communities (e.g. geographical or sectorial). These organisations have machine-to-machine communication needs that are internal or external to them, for example to other kind of organisations like governmental organisations. In order to

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support these machine-to-machine communication needs, there is the need to provide interoperable solutions among the software platforms that support their activities. As we are talking about exchange of information between machines (software), full compliance with international standards is essential. The search on bibliographic databases revealed no initiatives of interoperability between SSE Web Based Information Systems (WIS), so it was necessary to replace the literature review with two other sources of information: 1) Preliminary analysis of the WIS that support SSE activities; and 2) Interviews with the representatives of some of the world's most important SSE organisations. They showed that, in fact, the WIS are still not interoperable, but that there are efforts in this direction promoted by these organisations.

The objective of this article is to draw the state of the art on interoperability developments for the SSE world community, to present a framework of interoperability for the SSE and the developments made in the last 3 years in a research-in-progress PhD which aims to contribute to achieve this framework.

This document proceeds as follows. Section 2 shows presents the context in which the concepts of SSE, semantic Web and semantic interoperability are explained in more detail. Section 3 presents the methodology used for each of the tasks carried out in defining the state-of-the-art on interoperability developments for the SSE. Section 4 presents the state-of-the-art mentioned above and the developments in the framework of SSE interoperability. Closing conclusions and future work are drawn in the final section.

CONTEXTUALISATION

The Social and Solidarity Economy

The Social and Solidarity Economy (SSE), reported in the literature as the "other economy" is a third way, distinct from the market economy and the state power (Cattani et al., 2009). It boils down in a pragmatic way to the union or association of people with a common purpose for the group and the society around them, where new values are born in opposition to practices of the capitalist world that are considered predatory. The SSE is characterized by solidarity and equality, the collective ownership of the work and its non-alienation (Cattani et al., 2009). The concepts of Social Economy and Solidarity Economy are quite similar but yet different, and because they are used by the organisations we studied to define themselves, we will detail them and their differences.

In the Social Economy the stress lies, as Cattani et al. (2009) stated, on the "search for an economic democracy associated to social utility" (p. 156). The Social Economy was born to solve social problems that the state did not manage to solve. This form of economy has always existed, we can see it in the most remote human associations in Egypt, Greco-Latin antiquity, the Middle Ages in Europe, Imperial China or Pre-Columbian America (Cattani et al., 2009). These were systems of mutual support, both professional and religious or artistic.

Currently sociologists and other social scientists characterize the social economy in two ways:

1. The standpoint of identifying the main legal and institutional forms found - either if they are e.g. cooperatives, mutual societies, associations and foundations;
2. By identifying the common features of the companies or organisations - e.g. secondary profit, management autonomy, democratic control or the primacy of people and of the social object over the capital upon the distribution of surpluses) (Lechat, 2007).

Solidarity Economy is a concept broadly used in several continents, with varied meanings all around the idea of solidarity (Cattani et al., 2009). This form of economy has also always existed, but it was only spread as a concept at the beginning of the nineties, with the appearance of many initiatives of citizens that gathered according to the "principles of

cooperation, autonomy and democratic management" (p.162). In European peripheral countries and Latin America this association of workers arose as an alternative to capitalist society, and a way to survive to poverty and exclusion, adding values of native practices, making the community feeling prevail; it embraces also ecological, sustainable development, rights and duties of citizens, gender equality and respect for individuality and cultures worries. Solidarity Economy is characterized by solidarity and equality, by the collective ownership of work. It is based on the idea that those having no capital are not necessarily less able and have therefore the right to perform more complex and less alienating tasks.

Most of the people involved in the Solidarity Economy believe that they have a mission to change society in order to promote democracy, and to look for benefits for the whole and not just for the individual. The Solidarity Economy brought to the public debate notions of social utility and collective interest (J. L. Laville, 1994) while in social economy there are no such concerns or such explicit awareness. In fact, Solidarity Economy presents an alternative project of society more fair and less unequal: it is in fact a political project.

Solidarity Economy and Social Economy involve, together, a large number of citizens throughout the world that search, more or less consciously, to build a different paradigm for economy. In this study, we will use the acronym SSE (Social and Solidarity Economy) to refer to this large group of citizens that form the Social and Solidarity Economy.

SSE Organizations and Structure

Nowadays SSE is an important part of the economy. More than ever, some governments and the European Union stress its importance in the fight against poverty and in human development. For that reason they included in their programs policies that support the SSE. As Schiochet (2009) states, some governments have "actions that go deeper under the point of view of the action in itself and the internal consensus with relation to Solidarity Economy, when in others, actions are more seldom and residual" (p. 57).

Acording to Singer (2008), 10% of the world population is organized in cooperatives with ties to the International Cooperative Alliance[1], what corresponds to a value between 600 and 700 million people The European Parliament launched a resolution concerning Social Economy in society and the need to create politics of support and framing (Parliment, 2009). However, the best examples to report are Brazil and Luxembourg. Brazil, with Lula's government (2003-2010), created a specific Secretary of State for the SSE (Secretary of State of the Solidarity Economy). It is now the country where SSE is officially more meaningful (Singer, 2008). Recent studies, like the one of Singer, P. and Schiochet (2006) reveal the existence of 15 000 enterprises of Solidarity Economy in Brazil, in 2005, having this value increased to 22 000 in 2008 (Singer, 2008). In Luxembourg it exists a deputy minister for the Solidarity[2]; it is the only country in Europe where the government commits itself to SSE.

As it was stated before, SSE is made up of groups of people, associations, cooperatives or mutual benefit societies. This diversity of organisations, although considered vital to their strengthening, can bring some complexity to the cooperation among them. Currently there is a mix of social movements, networking organisations or chains of production, informal and household economy that can give SSE an extraordinary dimension. Networking integration is an one of equal elements whose purpose is the possibility of profit in the scale of production and in the homogenization of production and commercialization (FBES, 2008). Besides, it's not only about economic integration, but also about the establishment of economic ties based on the basic and fundamental principles of relationship between SSE organisations.

The existence of commercial relations does not imply the integration in a network, the network is characterized by the ties that are established (FBES, 2008). The networking

structure exists at local, national, international, and even sectorial level and makes it possible for the organisations to have access to strategies of action and resource sharing, enabling displacements in the social structure (Cattani et al., 2009). This is particularly important in SSE because through networking people have more power, more opportunities and social visibility, they develop namely relationships of exchange of goods or services (room for sharing and for personal and organisational strengthening) and cooperative agendas[3].

The types of networking relations existing in SSE are varied and depend much on the country where they operate. Figure 1 shows a representation of SSE organisations articulating locally, i.e. organizing themselves in local SSE platforms.

Figure 2 show examples of possible relations at national or international level. They are national meeting points, where local platforms (local organisations that elect their representatives) are represented in local, regional, national and/or international events and platforms (depending on the size of the country). There are also sectorial networks that organize themselves in a dimension of affinity: cotton producers, corn producers, carers of elderly people, for example (Scherer-Warren, 2006).

The organisation of these meeting points is somewhat replicated in the SSE Web Information System (WIS). These WIS support the organisation of these networks giving them a high visibility, potentiating the relations and transactions, and enabling the creation of new relationships. In some cases these relationships

Figure 1. SSE local networks and productive chains

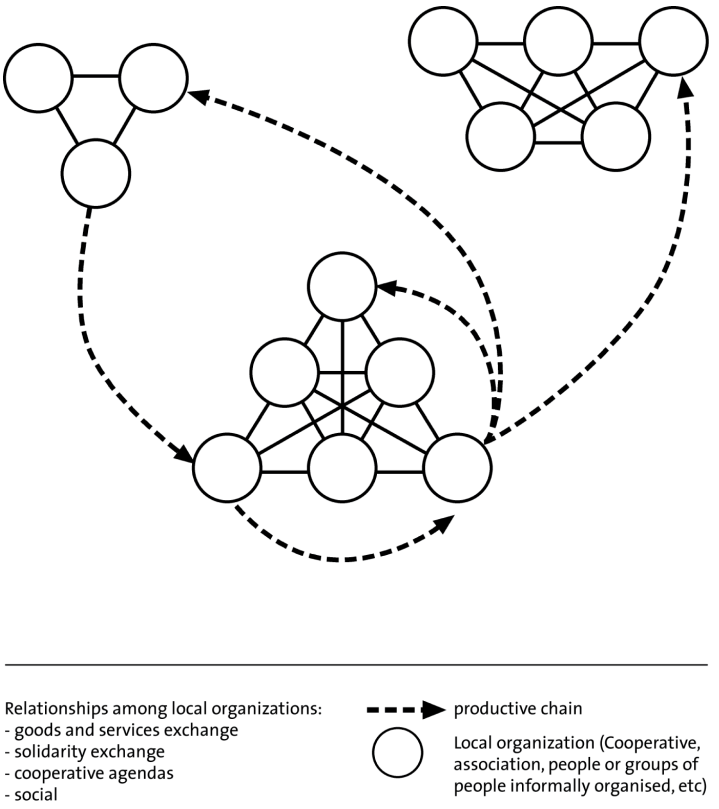
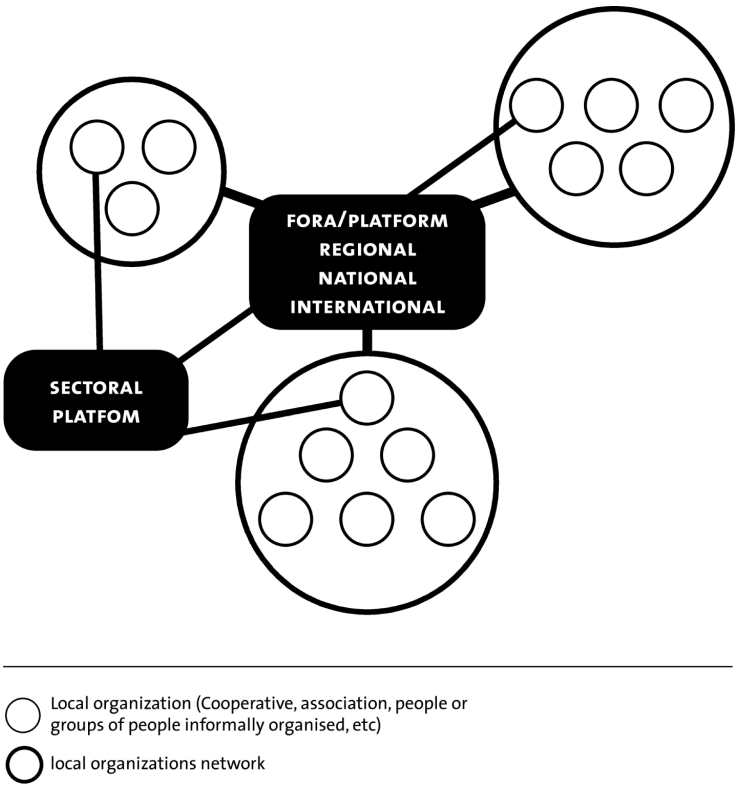


Figure 2. SSE regional, national and international networks



would be unthinkable without the existence of these systems due to geographical distances. These platforms/fora gather in the Intercontinental Network for the promotion of the Social Solidarity Economy[4] (RIPESS), a world place for promoting the SSE.

Web Based Information Systems for SSE

WIS are Informations Systems that are based on Web Technology. They can be integrated or not in common Information Systems (IS). WIS may be classified in different kinds of systems, such as intranets, web sites to interact with consumers and e-commerce sites to sell products and services (Yang & Tang, 2003). WIS have a strong impact on business as well as people's lifes (Wang, 2001).They enhance competitiveness of organisations, since they can lower transaction costs (e.g communications) and they allow organisations to focus on target groups through the use of marketing tools, customer relationship management systems and social web tools.

Normally the number of users of a WIS is unknown since the extranet part of the WIS can be available to the whole world. This can be a problem for the requirements engineers since it is very difficult to define stakeholders. However, they are powerful tools for the dissemination of information and enlarge the organisations' domain of action to the world.

In order for SSE WIS to fully replicate the networking structure of SSE organisations and operate globally, they need to share information and communicate with each other and with external non-SSE WIS. To do so, they need to be interoperable, i.e. they need to comply to and share among themselves and with external WIS

a number of standards, protocols and rules that range from some that are community specific to others that are worldwide applicable.

Semantic Web and Interoperability

There are several approaches to interoperability. For the sake of this article, we will focus on the definitions which are directly related to it. For more information about interoperability see, for example, IEEE (2010), IDABC (2004) and Payette, S. and Blanchi, C. and Lagoze, C. and Overly (1999).

In the context of Information Technologies interoperability can be defined as the possibility of multiple systems, with different kinds of software or hardware, and different data structures and interfaces, to exchange data without previous communication, with the minimum loss of contents and functionality (Press, 2004).

The Dublin Core Metadata Initiative (DCMI) defines interoperability in its glossary Woodley (2005) as:

The ability of different types of computers, networks, operating systems, and applications to work together effectively, without prior communication, in order to exchange information in a useful and meaningful manner.

Semantic interoperability focuses on meaningful exchanges of information, i.e. the information has the same interpretation (or very closely) by both the sender and the receiving systems. Our work takes place under this perspective and it is done in the context of the Semantic Web.

The Semantic Web has technologies that ``enable people to create data stores on the Web, build vocabularies, and write rules for handling data. Linked data is empowered by technologies`` that started to emerge in 1999. It is about common formats for integration and combination of data from different sources (W3C, 2012a). This data is mostly what is being called metadata, in the way that it is "data about data" (DCMI, 2011) and follows well-defined rules of metadata schemes. A metadata scheme is a set of ``metadata elements designed for a specific purpose, such as describing a particular type of information resource`` (Press, 2004). The DCMI is probably the most well-known and influential worldwide initiative in what concerns metadata. In order to provide "a foundation for the development of application-independent syntax specifications and constraint languages", DCMI developed the Dublin Core Abstract Model (DCAM) (Powell, Nilsson, Naeve, Baker, & Johnston, 2007) that presents the components and constructs used in DCMI metadata. One of these constructs is the Dublin Core Application Profile (DCAP), - "a generic construct for designing metadata records" (Baker & Coyle, 2009), a DCAP describes "the structure and contents of data" (Baker & Coyle, 2013). The definition of rules to build a DCAP is set in the "Singapore Framework for Dublin Core Application Profiles", a DCMI recommendation - c.f. Nilsson, Baker, and Johnston (2008). This DCMI work has been developed under the hat of international standards. Actually, the use of these international standards is critical when it comes to semantic interoperability, but it is not sufficient, since to achieve high levels of interoperability a community needs to follow some rules. These rules are defined in the interoperability layers model - c.f. Nilsson, Baker, and Johnston (2009), which allows a community to assess the "interoperability reach" of a particular implementation. This model defines 4 levels of interoperability.

When we talk about resources description using metadata schemes, these 4 levels have to do with the use of:

1. Metadata schemes and DCMI vocabularies (Dublin Core Metadata Element Set and dcterms), in level 1 and 2; and
2. DCMI standards: DCAM and DCAP, in level 3 and 4.

Level 4 is the highest level of interoperability defined by DCMI, and it is achieved

when a community uses the DCAP construct as a reference and binding to describe its resources. A DCAP became a very important instrument to implement interoperability.

METHODOLOGY

We intended to conduct a literature review about interoperability on SSE WIS, performed an analysis of these platforms and made a series of interviews to their community leaders. This section presents in detail the methodologies we used on each of these steps.

LITERATURE REVIEW

In the first part of the bibliographic search we have done general searches and then more specific searches in on-line databases: Google Scholar[5], ISI Web of Knowledge[6], SCI ETD Networked Digital Library of Thesis and Dissertations[7], Scopus[8] and Oaister[9].

Four different main lines of basic searches were taken into consideration: on SSE, on Interoperability, on Web based Information Systems and on Interoperability for the Social and Solidarity Economy.

These searches were done in English, in Portuguese and Spanish. The former because it is the main language used in scholarly communication, the latter two because they are languages of countries where the SSE is developed the most in the world (Latin America, in particular Brazil) (Singer, & Schiochet, 2006).

A central set of articles was selected, but no article was found that had a reflection or study on the specific aspect of interoperability for the SSE.

In the second phase of the search the references of the selected set of articles were analysed, allowing us to select new articles by relevance of title and abstract. Then an iterative process was implemented in what the new articles were concerned, finishing the process when there were no new articles being referenced.

In the third and last phase of the search process, new articles were selected when they would refer the central set of articles kept in phase 1. These new articles were chosen following the same criteria as in phase 2.

The articles selected were used to draw the context, but not the topic itself as we could not find any articles on interoperability initiatives on the SSE area.

ANALYSIS OF SSE WIS AND INTERVIEWS

The RIPESS was the starting point for our study. RIPESS has a website with a list of all the websites and WIS of the SSE networks in the world. It should be noted that in spite of SSE initiatives in all five continents, only a small number of organisations are registered in a WIS. It should also be highlighted that the fact that there are no WIS for some continents or countries it doesn't mean that in these continents or countries the SSE is not organized in the field or doesn't have non-WIS software platforms to support it; it means that for some reason (organisational, political, economical or other) an Internet support tool was not yet implemented. It is not the objective of this work to explain the reasons for this fact.

The process had two phases. In the first phase we did a preliminary study based on a set of WIS chosen from the RIPESS website. This choice followed the criteria:

1. At least one website per region;
2. When there were more than one website in the region, the ones selected had to have at least some of the following defined functionalities: Themes, Events, News, Blog, Social Network, Catalog, e-commerce, Tags, RSS feeds, Metadata.

The results of this filtering may be accessed through the link http://www.maltas.org/1stphase.pdf .

Based on these results, we selected for an exploratory analysis the WIS that were the most developed in terms of the functionalities described previously as shown in Table 1.

We additionally conducted an interview to each of the representatives of the organisations listed in Table 1[12].

All the interviews were done through Skype, and their main objectives regarding WIS were:

1. To identify the WIS that support these organisations;
2. To understand how these WIS work through the point of view of their creators;
3. To do an exploratory study of the organisations interoperability needs.

Six (6) interviews were conducted (see Table 2) and all of them were recorded and transcribed (recordings and transcripts can be accessed in the handles referred in Table 2). These interviews were semi-directive as they were adapted to the characteristics and experiences of the interviewee. The interviewees received the script[13] by email some weeks before the date of the interview. Some of them emailed back some answers before the interview.

WEB BASED INFORMATION SYSTEMS FOR THE SOCIAL AND SOLIDARITY ECONOMY - STATE OF THE ART

Analysis of SSE WIS and Results of the Interviews

In the following section we will inform about the most advanced WIS in the world. They are the Internet "show room" of the organisations in their countries.

Austria: Vivir Bien

The case of Austria is a very particular one because Austria is a country where the social state is very strong. The SSE is defined outside the *status quo* of society. The Vivir Bien interviewee says:

(...) I would say in Austria the tradition is that the state is much more involved, because we have a strong Social Democrat tradition so the tradition is that the state itself is much more involved actually in these things and we don't really have this tradition of social economy as really independently embedded in the economy. Interviewee F

Table 1. List of the SSE WIS studied

Country	Organisation	WIS URI
Austria	Vivir Bien	http://vivirbien.mediavirus.org
Brazil	Forum Brasileiro da Economia Solidária	http://www.cirandas.net
Brazil	Solidarius	http://www.solidarius.com.br
Canada (Québec)	Chantier de l'Économie Sociale	http://www.economiesocialequebec.ca http://www.achetersolidaire.com[10]
France	Mouvement pour l'Économie Solidaire	http://www.le-mes.org/Consulter-la-BDIS.hmtl
Italy	Fondazione Culturale Banca Etica	http://www.zoes.it http://www.buonmercato.org[11]
Luxembourg	Institut Européen de l'Économie So lidaire	http://www.ecosolux.lu
Spain	Red de redes de Economia Alternativa y Solidaria (REAS)	http://www.economiasolidaria.org

Table 2. List of the interviewees

Interviewee	Country	Organisation	Handle
A	Canada (Québec)	Chantier de l'Économie Sociale	http://hdl.handle.net/1822/18422
B	Italy	Fondazione Culturale Banca Etica	http://hdl.handle.net/1822/18420
C	Luxembourg	Institut Européen de l'Économie So lidaire	http://hdl.handle.net/1822/18426
D	France	Mouvement pour l'Économie Solidaire	http://hdl.handle.net/1822/18424
E	Spain	Red de redes de Economia Alternativa y Solidaria (REAS)	http://hdl.handle.net/1822/18425
F	Austria	Vivir Bien	http://hdl.handle.net/1822/18427

The "Vivir Bien" WIS is built by a group of people, informally organized, that volunteered to manage the system. They do not represent any formal organisation and they don't own any label of SSE. This informality is present in all aspects of this project since there are no goals to achieve. Anyone (person, group of people, organisation, initiative) is free to join "Vivir Bien" as long as they receive an invitation from an user already registered in the system (to control SPAM). The interviewee, Flo Ledermman, presents "Vivir Bien" as a set of resources that can be added by any user without any limitation or control. A resource can be anything, e.g a market, a shop, or bread offered in a bakery. Every resource has information about it, with no limits for the information one wants to introduce. These resources are mapped with geographical information. The WIS is then a set of resources with information, mapped and organized in themes. The interviewee presents the logic that is behind the development of the system:

(...) We use it in the same way as semantic Web, we use it as statements as triples, you know, you have the resource and you have the predicate and you have an object, as it is really the same. So really the tags, in my opinion, I mean, tags is a bad word, because it is used with a different meaning. (...) our tags are more sophisticated, they have a key and the values, they are really statements. Interviewee F

Brazil: Cirandas

The "Forum Brasileiro para a Economia Solidária" is the responsible for the WIS "Cirandas". This WIS is built upon Noosfero[14], an open source software specifically developed for the Solidarity Economy in Brazil. This WIS has 4789 individual users, 21859 organisations/initiatives/enterprises and 360 communities of SSE[15]. As Noosfero implements social networks, all these communities were naturally created in a way that mimics the real networks in the field. It is, however, important to note that new virtual networks were established due to the online presence of these communities - those reinforce even more SSE in Brazil. The functionalities of "Cirandas" are: blog, private and public chat, networks (of people, communities and organisations or initiatives or enterprises). Each "Cirandas" organisation, initiative, enterprise and community user has a show page of their own products and services (a kind of a catalog but with no e-commerce functionality) and another page to show the location (in a Google map) of the physical shops of the organisation.

Every user of "Cirandas" can self-define within a list of themes. Through the use of a search tool it is possible to find theme partners for a productive chain or for a social network (e.g. political affinities).

Cirandas is a very powerful tool to promote the SSE Brazilian organisations and networks.

Brazil: Solidarius

The Solidarius WIS is maintained by a self-organized social economy initiative and it is open to any world citizen interested in developing SSE initiatives. Solidarius allows users to implement social economy enterprises, collaborative networks, community banks, to sell and buy products or services within the system, to implement cooperatives and to implement groups with social currency exchanges. A social currency exchange is a concept created by the Solidarius project. To know more about it see (Mance, 2008).

Solidarius has a few extra functions with respect to the other portals described. These functions implement a kind of "economic intelligence" and they are: the analysis of value exchanges and network (consumption / production), the "business" plan with SSE criteria, and the Solidarity Interchange System (SIS - Sistema de Intercambio Solidário) which has a "value representation". This is a very particular system, unique in the world. According to Solidarius (2011):

Each member of the Solidarius community has a credit account Solidarius that enables the user to make local or international exchanges of products and services. The value of items exchanged is measured in Solidarius credits. The items offered can be seen in the window of the SIS. Solidarius Credits are generated by the users, being associated to the donations made by them to a World Fund for Solidarity Economy, which is organized by the National Sections. The record of these donations are made by the operator of the National Section of the Fund receiving the donation. This operator is elected by the participants in each country. The Fund is self-managed by the Community itself and has direct democracy mechanisms provided by Solidarius. All transactions are recorded electronically and these records are accessible to all participants, ensuring full transparency to the system.

Canada: Economie Sociale Québec

The "Chantier pour l'Économie Sociale" is the organisations in charge of the WIS "Économie Sociale Québec" . This WIS is organized by activity sector where each sector has common elements: texts, documents, profiles, blog, news, job offers and products and services. The products and services are browsed but the selling is done in another WIS specially developed for e-commerce, the "Acheter solidaire" WIS.

The new users are accepted through their juridical status, and when they have doubts about the suitability of a certain new user, they contact the local/regional "Chantier" offices in order to have more information on the organisation that is being accepted.

The WIS "Économie Sociale Québec" is a system to support the organisations activities. Users can upload documents, create news and events. Theres is also an organisation mapping with geographical information.

The "Chantier" also made the political choice of defining a different website for the e-commerce functionality. This e-commerce portal has the particularity of having a bank of offers and requests concerning products or services that can be posted by users.

France: La bdis

The "Mouvement pour la Économie Solidaire" (MES) is the organisation that implemented and maintains the WIS La BDIS. This WIS maps all the Solidarity Economy organisations in France, but not the Social Economy organisations, since MES is an "umbrella" organisation of only the Solidarity organisations in France. La BDIS does not not support the activity of this Solidarity organisations. Each organisation is identified in a map and has its own profile

available. MES has a criteria to accept its member organisations. This criteria has to do with identity, values of the SSE and compromises, the last issue is a rather political one.

In France there are different "umbrella" organisations that group the Social Economy organisations, though the French Social Economy organisations are not mapped in La BDIS and they are neither a member of the RIPESS. This has to do with the "umbrella" organisations and its political choices.

MES built a chart of principles which has to be signed by every new organisation that wants to enter La BDIS. This WIS has only available as information the profile of the users, allowing organisations to see the mapped SSE organisations but there are no other tools for networking. Theres is also an organisation mapping with geographical information.

It is interesting to note that there are several e-commerce sites in France that sell SSE products. The interviewee refers a particular e-commerce website: Eco- Sapiens[16]. The webmaster of this e-commerce website was contacted by email and confirmed this information. He added that Eco-sapiens exchanges data automatically with the suppliers through XML technology.

Italy: Zoes

The WIS "Zona Equosostenible" (ZOES) is a portal for social networks, geographic referencing and thematic on SSE in Italy. This WIS was created and is maintained by the "Fondazione Culturale Banca Etica". ZOES supports the organisations activities which are registered in the platform. To become part of ZOES, new organisations must be certified by the Italian agency that gives the SSE stamp and must be recommended by one organisation already registered in ZOES. Besides, the new organisations must go through a sorting process, through the filing of an on-line form. In this form, the 5 first questions are crucial to be accepted in ZOES since if the new organisation answers "no" to one of these 5 questions it will be immediately rejected by ZOES. We note that there is very specific information concerning SSE on this WIS, it has to do with: certifications and recognitions of the organisations; their network inside the system; the possibility to define themselves as experts in a certain field which will allow to be directly contacted by a consumer or other organisations to look for expertise inside the network.

This WIS is complemented by an e-commerce portal, which besides all the common functionalities of an e-commerce site (sell services and products) has specificities to SSE such as: the "transparent price" which is a way for a consumer to know the parcels of any product's price (parcel of production, logistics, etc); and an emphasis on the good practices of the producer (environment, labor, etc) which are clearly shown on the page of the product. It is interesting to note that it was a political choice to separate ZOES from the e-commerce activities.

Besides selling products and services through *Buon Mercato*, ZOES is a working space for SSE promotion. There is a set of functionalities which are cataloged in ten different themes. These functionalities are: job offers. edited books, documents, links to organisations which are cataloged on this thematics, news, events and forum. There is also an organisation mapping with geographical information.

The wish to share information with the world SSE community on thematics and the organisation's information is clearly stated by the interviewee:

My idea is that, both in Italy and internationally, we should start sharing the information we have inside, naturally being careful of having the authorization of the users. So the content, when the users register they know, and we have it also in our policy, which is in the terms of use and the principles which are bellow at the end, and also in the instructions on how you use ZOES on the top. In principle it is all open content, creative commons, so we expect, if it is on the Internet and it's public profile, we expect that that content can be shared.

(...) This is a user content platform, as you can see bellow the footer, before saying who promotes it, there are 10 colored buttons and these are the 10 themes in which ZOES is thematically divided (...) we want to share that! Each of these have RSS and even the profiles have its own RSS and can be replicated in any other Web site. But the idea of the project we are doing with RIPESS is that we will be able to share information with common filters, so that it is comparable information, not just copy that information, but you can compare and work on it and to find information, to aggregate information etc (...). Interviewee B

Luxembourg: Ecosolux

The"Institut Européen de l'Economie Solidaire" created the WIS ECOSOLUX with the aim of developing the Solidarity Economy in Luxembourg. In this WIS there are initiatives and organisations that are selected by a piloting committee. This committee analyses the forms new candidates fill on the WIS and accepts them in regular meetings held in Luxemburg. The organisations profiles can be updated by the organisations or initiatives as soon as they have access to the WIS. News and events are introduced by the WIS webmaster and there is no tool for the networking of organisations registered on ECOSOLUX.

Spain: Economia Solidária

The "Red de redes de Economia Alternativa y Solidária" (REAS) is a Spanish network of networks which is organized by region. This organisation is responsible for the WIS "Economia Solidária". To be part of this WIS the organisations have to be registered in a local/regional REAS.

This WIS has the particularity of having sheets of "good practices" (environmental, economical, etc) with text and multimedia information, produced by the organisations, in order to share knowledge and experiences.

The users of this WIS can update their profile, introduce information (news, documents, bibliography and vídeos) and tag them. The interviewee noted that tags are very ambiguous and that they have a lot of work organizing them. Theres is also an organisation mapping with geographical information.

The interviewee also said that there is some data exchange (news cataloged in tags) between the *Economia Solidária* Portal and the Brazilian WIS "Cirandas" and the site REAS of Latin America and Caribean. This is done through RSS feeds which are also organized with tags.

ON THE WAY TO IMPLEMENT A FRAMEWORK OF INTEROPERABILITY ON THE WIS SSE

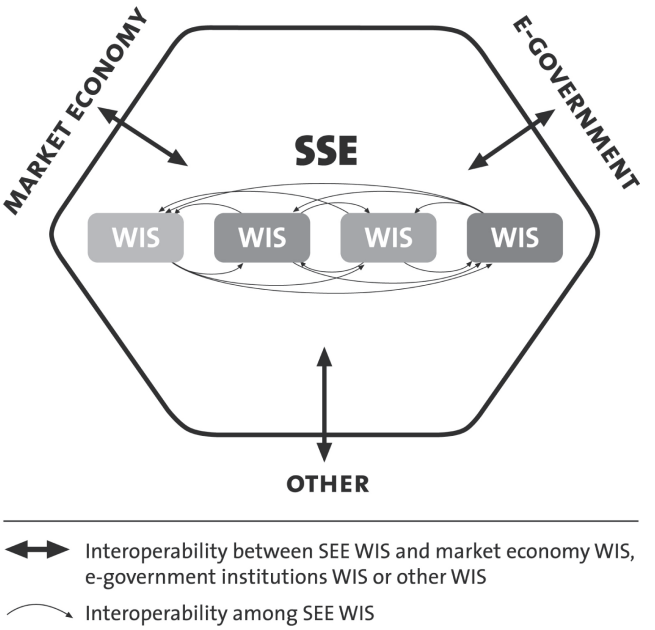
Context

The SSE world community is facing a global challenge. They are willing to implement interoperability between their WIS to build a global SSE e-marketplace; and among their WIS and external ones (see Figure 3).

In the end of 2010 RIPESS has created a task force for the development of interoperability among its members' WIS. This is a pilot project that they intend to enlarge as soon as new countries have WIS with conditions to join. The members of this task force have been sharing information in an informal way in the past, and they committed to map the SSE organisations in each country as a first step for a world mapping. The main goals to achieve through interoperability are:

1. **More visibility as a whole:** This visibility has distinct levels:
   a. **Final consumers:** Buy SSE products; to become aware of the state of the art of SSE;
   b. **Governments:** To become aware of the world dimension of SSE and to

Figure 3. Interoperability interfaces among SSE WIS



have access to statistics and global information;

2. **Larger network dimension:** What was local becomes global, the world dimension is expected to strengthen SSE.

In February 2011 this RIPESS task-force met in Paris for the first formal meeting. They met again in October 2011, in the World Forum for the SSE, held in Québec, Canada. Again they have stressed their goal of strengthening their networks (that have been existing in the field for some years) using interoperable WIS, sharing semantics. In this meeting they decided to develop the following common controlled vocabularies:

1. **Qualifiers:** For Products & Services or for Activities;
2. **Activities:** Activity sector;
3. **Themes:** Meta themes for cataloging documents, discussion groups or mailing-lists;
4. **Products & Services:** A list of terms with products and services. This list is based on the United Nations Standard Products and Services Code (UNSPSC)[17] until the second level, removing some categories.

These vocabularies were developed during the years 2011 and 2012 by the task-force, integrating a member of the research team, as an observer. The first 3 controlled vocabularies were developed in SKOS (c.f W3C (2012b)) and can be found at http://www.essglobal.info/standards/. The Product & Services controlled vocabulary is still in a draft version and only the final version will be developed in SKOS.

In 2012, project managers of the organisations that are part of this task force were aware that they needed both an internal (nationally) and external (internationally) organisation, in order to have the same interpretation (or very closely) by all the members to allow meaningful exchanges of information amongst their WIS. It was clear that they would need to find a common framework of understanding. In 2012 the mapping of the RIPESS organisations in each country was finished as well as the development of 3 of the 4 controlled vocabularies; the task-force was aware that metadata schemes help to

solve part of SSE interoperability needs, since it is possible to use vocabularies, classes and properties to describe resources within communities (Rühle, Baker, & Johnston, 2011). However, they also know that compliance with metadata schemes are not enough when it comes to an international semantic interoperability framework among WIS. In order to achieve Dublin Core level 4 of interoperability there is a need to develop a DCAP (Nilsson et al., 2009). RIPESS decided to develop a DCAP for the SSE' WIS world community (DCAP-SSE) and a new team was created to acomplish this task. This work is under way and is briefly described in the next section.

THE DCAP-SSE DEVELOPMENT PROCESS

The DCAP-SSE development is integrated in a research project that has as aim the contribution to a method to develop a DCAP - Me4DCAP (c.f Curado Malta & Baptista, 2013). It is the experimental situation of the Design Cycle of Hevner's (2007) 3 cycles. Me4DCAP is being defined in cycles of construction and evaluation along with the DCAP-SEE development process.

The RIPESS team that started the work in the DCAP-SSE is composed by four persons with the following overlapping competencies:

1. Four domain experts;
2. One system analyst in the cooperative EITA[18] and a SSE network manager;
3. One system analyst and software developer in the cooperative EITA and researcher in Linked Open Data in Universidade Federal de Rio de Janeiro, Brazil;
4. One SSE specialist, researcher in Haverford University, in the USA;
5. One SSE network manager (manager of Zoes).

A member of the research team (Portugal) attended all meetings – guiding the group in the Me4DCAP process, and also as a Semantic Web technologies expert. The meetings were done using audio-conferencing (Skype). The project used a Wiki to document the process, and the PONTAOPAD[19] tool as logbook for the meetings. The Wiki page with all up to date information of the DCAP-SSE building process can be found at http://www.essglobal.org/wiki (login: guest; password: guest).

Me4DCAP defines this process: the starting points are the Singapore Framework, Rational Unified Process (c.f. Kruchten, 2004) and the DCMI Guidelines. According to the Singapore Framework, a DCAP is composed by:

1. Functional Requirements (Singapore Stage 1)
2. Domain Model (Singapore Stage 2)
3. Description Set Profile (Singapore Stage 3)
4. Usage guidelines (optional) (Singapore Stage 4)
5. Syntax guidelines(optional) (Singapore Stage 5)

The DCAP-SSE development process achieved already the first two stages of the Singapore Framework. To develop the Description Set Profile (Singapore Stage 3) – a constraint language to describe DCAP defined by Nilsson (2008) - there are some steps to follow: the Detailed Data Model Diagram (DDMD) development, the matrix metadata schemes development and the DCAP-SEE validation in laboratory. The team developed already the draft version of the DDMD which needs a validation of the whole group. The next step is underway: to do a matrix with information about the metadata schemes (and its terms) of the metadata community that better relate to every object of the DDMD. It is already clear for the team that some of the properties of the DDMD do not relate appropriately with terms from other metadata schemes; that means that the team will have to coin new terms (RDF properties). These properties have to do with the particular context of the SSE already described in the first section of this paper. A validation in laboratory will follow to check the DCAP-SSE adequacy against a sample of resources

identified by the team, this sample has to be a trustworthy sample of the application domain of the DCAP-SSE.

At the end of the DCAP-SEE development process, a validation in production will be performed, as defined in Me4DCAP. We expect to use SSE WIS to validate the first version of the DCAP-SSE: Cirandas, Zoes and a new platform (under development) in the USA built upon Noosfero. The implementation and the validation processes will probably last some months, if not years. After this validation the DCAP-SEE draft version will have to be assessed against the outputs of the process of validation; a DCAP development is in fact an iterative process.

The SSE community will take some time to adopt the first version of DCAP-SSE. As some SSE networks around the world are willing to develop new WIS to support their work in the field, they will hopefully be open to use the DCAP-SSE as reference and binding to describe their resources. Therefore, this seems to be the right moment to introduce it to the SSE community.

CONCLUSION AND FUTURE WORK

The Social and Solidarity Economy (SSE) world community constitutes a very particular case of economy; it is in fact more than economy: networks are created and information exchanged – beyond the normal commercialization of products or services – with care and respect for the other, for the society and the planet. Their presence on the Internet is supported by specific SSE WIS that in some ways replicate the physical networking organisation. However, to do it fully, these platforms need to be interoperable.

The bibliographic searches revealed that so far there is no literature concerning interoperability in SSE WIS. To confirm these results the analysis of the SSE WIS revealed that there are some connections between platforms but that they are still very incipient (e.g., through RSS feeds) and the interoperability is very rudimentary if existing at all. The interviews to the WIS technological leaders revealed that SSE organisations are very interested in the topic and that they have, inclusively, started to do some work on it. In order to achieve interoperability amongst their WIS, a SSE world community team is building a DCAP-SSE which is also integrated in a research-in-progress PhD project.

As future work we will finish the DCAP-SSE and validate it in production in an iterative process as defined by Me4DCAP.

KEY TERMS AND DEFINITIONS

Community: A formal or informal association of people that share the same goals and visions of a certain dimension of their lives.

Interoperability: The ability of different types of hardware and software to work together effectively, without prior communication, in order to exchange information in a useful and meaningful manner.

Metadata: Structured data that describes resources. This data explains, locates or makes it easy to recover, use and manage the described resources.

Networks: A set of social units and direct or indirect relations, with a common goal.

Social Solidarity Economy: An economy different from the market economy, where profit is not a goal. In Social and Solidarity Economy people associate in informal or formal groups and have common goals, these goals are neither centered in profit nor in individualistic needs.

Web Based Information Systems: Information Systems based on the Web technology.

Semantic Web: A paradigm that implements a semantic interoperability

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ENDNOTES

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